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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/761,753	01/18/2001	Yukimasa Ishida	980307A	8695

23850 7590 10/01/2002

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EXAMINER

TOLEDO, FERNANDO L

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 10/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/761,753

Applicant(s)

ISHIDA ET AL.

Examiner

Fernando Toledo

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 22-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 22-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☒ Certified copies of the priority documents have been received in Application No. 09/041,674.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) ✓
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 22 – 30 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 22 discloses the following limitation: forming a second oxide on the conducting layer by anodic oxidation after a first oxide film with a thickness is formed on the conductive layer; washing the substrate whereby the first oxide film is removed by the washing and the second oxide film is not removed by said washing.

How can a first oxide film that is formed on the conductor be washed without removing a second oxide film that is on top of the first oxide film? How can both films be formed on the conductor if the first film is already being formed on the conductor?

If interpreted that a first oxide film is formed on a portion of the conductor and the second oxide film is formed on another portion of the conductor, how can the first oxide

Art Unit: 2823

film be removed from the conductor without damaging or altering or even removing the second oxide film?

3. Claim 7 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 7 discloses that the side surfaces of the connection portions are outwardly convex. However, claim 7 is dependent on claim 1 and claim 1 discloses wherein the sides are inclined.

How can the bus lines sides be outwardly convex when they are also inclined? How can both features that are geometrically so different from each other be made on the same sides of the bus lines? Does inclined meaning the same as outwardly convex?

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 4 recites the limitation "the step for ashing" in page 37, line 32. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 – 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (U. S. patent 6,338,991 B1) in view of Noumi et al. (U. S. patent 5,915,172).

In re claim 1, Zhang in the U. S. patent 6,338,991 B1; figures 1A – 11D discloses, forming a conducting layer composed of an anodically oxidizable metal on a substrate (figure 4A); etching the conducting layer to form several of bus lines having upper surfaces parallel to the substrate and connection portions electrically connected to the bus lines and having upper surfaces parallel to the substrate (column 13).

Zhang does not teach wherein the bus lines and connection portions have inclined sides.

However, Noumi discloses also forming a thin film transistor (TFT) wherein the bus lines and connection portion have tapered or inclined sides to improved the coatability of the etched films (figure 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the bus lines and connection portions of Zhang with inclined or tapered sides because according to Naumi, the tapered or inclined sides of the bus lines and connection portion improve the coating of the etched films.

In re claims 2 and 3, Zhang does not disclose wherein the inclined sides have angles ranging from 20 – 60 degrees or from 30 – 50 degrees.

However, Naumi discloses that the inclined sides can be adjusted by modifying the composition of the etchants in advanced (column 4).

Art Unit: 2823

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the angles of the inclined sides to be between 20 – 60 or 30 – 50 degrees, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Also, notice that according to Naumi, the inclined sides range can be adjusted by adjusting the compositions of the etchants.

In re claim 4, Zhang discloses forming a mask on the conducting layer prior to the etching step (column 13).

Zhang in view of Naumi does not disclose ashing the substrate and the mask prior to etching.

However, Examiner takes official notice that it would have been obvious to one of ordinary skill in the art at the time the invention was made to ash (i.e. remove) the unwanted mask material so that the etching pattern can be clearly done on the conductor layer.

6. Claims 5 – 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang in view of Naumi as applied to claims 1 - 4 above, and further in view of Angelopoulos et al (U. S. patent 6,331,356 B1).

In re claims 5 and 6, Zhang teaches forming a mask on the conducting layer (column 13).

Zhang in view of Naumi does not teach the step for baking the mask prior to the etching step, wherein the temperature for baking the mask in the baking step is so set (i.e. not higher than 115°C) that the mask will have a relatively small rigidity so that an

Art Unit: 2823

outer portion of the mask is pushed up from the conducting layer due to a reaction gas in the etching step.

However, Angelopoulos in the U. S. patent 6,331,356 B1; figures 1 – 38 discloses a method for making patterns in TFT conductor layers wherein the mask is baked at a temperature not higher than 115°C prior to etching the conductor layer (columns 20 and 21).

Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the etching mask of Zhang in view of Naumi according to Angelopoulos since the method of Angelopoulos will enable one of ordinary skill in the art to form a masking layer on the invention of Zhang in view of Naumi.

Zhang and Naumi in view of Angelopoulos do not disclose wherein the mask will have a relatively small rigidity so that an outer portion of the mask is pushed up from the conducting layer due to a reaction gas in the etching step.

However, it would have been obvious to one having ordinary skill in the art that since the mask of Zhang and Naumi in view of Angelopoulos is treated similar to that of the claimed invention and absent to evidence of the contrary, the mask of Zhang and Naumi in view of Angelopoulos will have a relatively small rigidity so that an outer portion of the mask is pushed up from the conducting layer due to a reaction gas in the etching step.

In re claim 9, Zhang discloses removing part of the outer oxide film to expose the inner conducting portions after the step of anodic oxidation (column 13).

Zhang and Naumi in view of Angelopoulos do not disclose wherein the removing of the outer oxide film is done by ion milling.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use ion milling to remove a portion of the outer oxide layer, since it has been held to be within the general skill of a worker in the art to select a known removing technique on the base of its suitability, for its intended use involves only ordinary skill in the art. *In re Leshin*, 125 USPQ 416.

7. Claims 31 – 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. in view of Naumi.

In re claim 31, Zhang discloses forming a semiconductor layer having a predetermined shape on a substrate 21a and 21b; forming an insulating film on the substrate to cover the semiconductor layer 22; forming a conducting layer composed of an anodically oxidizable metal on the substrate in such shape as to cover a portion of the semiconductor layer and to form gate electrodes having an upper surface parallel to the substrate (figure 4A); anodically oxidizing the gate electrode (column 13); forming the insulating film into a predetermined shape using the gate electrodes including the anodically oxidized film as a mask (figure 4C); injecting impurities into the semiconductor layer using the gate electrodes including the anodically oxidized film and the insulating film as a mask to form an offset in the semiconductor layer (column 13).

Zhang does not teach wherein the bus lines and connection portions have inclined sides.

Art Unit: 2823

However, Noumi discloses also forming a thin film transistor (TFT) wherein the bus lines and connection portion have tapered or inclined sides to improved the coatability of the etched films (figure 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the bus lines and connection portions of Zhang with inclined or tapered sides because according to Naumi, the tapered or inclined sides of the bus lines and connection portion improve the coating of the etched films.

In re claim 32, Zhang teaches wherein the thin-film device is a substrate including thin-film transistor (figure 4C).

In re claim 33, Zhang teaches wherein the anodically oxidizable metal includes at least one of Al, Ta, Al-Si, Al-Ta, Al-Zr, Al-Nd, Al-Pd, Al-W, Al-Ti, Al-Ti-B, Al-Sc, Al-Y, Al-Pt and Al-Pa (column 13).

In re claim 34, Zhang teaches wherein the anodically oxidized film is a barrier-type anodically oxidized film (column 13).

In re claim 35, Zhang teaches wherein the semiconductor layer includes polycrystalline silicon (column 12).

In re claim 36, Zhang teaches wherein an initial current density at the time of executing the anodic oxidation is not smaller than  $2.0 \text{ mA/cm}^2$  but is not larger than  $3.0 \text{ mA/cm}^2$  (column 13).

8. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang in view of Naumi as applied to claims 31 – 36 above, and further in view of Bae et al. (U. S. patent 5,202,274).

Art Unit: 2823

Zhang does not disclose wherein the etching is either ionic milling or dry-etching.

Naumi discloses forming tapered or inclined electrodes using a wet etch composition.

However, Zhang in view of Naumi does not teach wherein the etching is either ionic milling or dry-etching.

Bae discloses forming tapered or inclined electrodes using a dry etch composition (column 3).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the gate electrodes of Zhang by dry-etching as taught by Bae instead of wet etching since one of ordinary skill in the art will realize that dry etching and wet etching the gate electrodes for the disclose intended purposes are art recognized equivalents. Also, choosing a well-known etching technique on the basis of its suitability requires only ordinary skill in the art.

9. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang and Naumi as applied to claims 31 – 35 above, and further in view of Wolf and Tauber (Silicon Processing for the VLSI Era Volume 1: Process Technology, pp 452 – 453).

Zhang in view of Naumi do not teach wherein a resist mask is post-baked at a temperature not lower than 130°C but not higher than 200°C, prior to forming the gate electrodes.

However, Wolf and Tauber in the textbook "Silicon Processing for the VLSI Era Volume 1: Process Technology", pp 452 – 453 discloses as conventional in the art to

Art Unit: 2823

post bake a photoresist prior to etching the layers below at a temperature not lower than 130°C but not higher than 200°C.

Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to post-bake the photoresist of Zhang in view of Naumi prior to etching the gate electrodes to a temperature of 130°C but not higher than 200°C as taught by Wolf and Tauber as it is the conventional way to prepare a photo resist prior to etching the layers below it.

### **Conclusion**

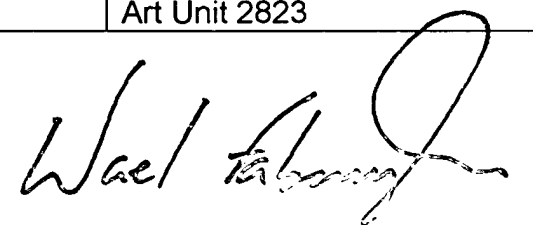
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando Toledo whose telephone number is (703) 305-0567. The examiner can normally be reached on Monday – Friday, 8am – 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

	Fernando Toledo Patent Examiner Art Unit 2823
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ft  
September 25, 2002

  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER